Appl. No. 10/717,341
Amdt. dated January 11, 2008
Reply to Office Action of October 18, 2007

PATENT

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application. Added text is indicated by <u>underlining</u>, deleted text is indicated by ~~strikethrough~~. Changes are identified by a change bar in the margin.

Listing of Claims:

1-9. (canceled)

10. (currently amended) A method of operating a storage system <u>comprising a disk array accessed by one or more host computers,</u>

wherein when ~~a~~ <u>the</u> storage system detects that an amount free space of the storage system has become less than a predetermined value, a remote storage area is provided by performing a mount operation <u>from the storage system</u> on one or more disk units at a remote storage system in communication with said storage system so that said remote storage area serves as said storage area <u>accessible by the host computers,</u>

wherein a size and a speed of at least one of reading and writing of said remote storage area to be utilized are specified in a utilization demand message from said storage system to said remote storage system that identifies a predetermined port ID of the storage system, and

wherein said remote storage system determines if said remote storage area can be provided in accordance with said size and speed, and if it is possible, sends a data packet from the remote storage system to the storage system, said data packet identifying a remote unit ID of the remote storage area that is to be stored in a port management table of the storage system in accordance with the port ID identified in the utilization demand message and thereby mounting said remote storage area and providing said remote storage area having said size and said speed as the storage area for said storage system.

11. (currently amended) A method of operating a storage system <u>comprising a disk array accessed by one or more host computers,</u>

3   wherein when a the storage system detects that an amount of its free space has

4   become less than a predetermined value, a remote storage area is provided by performing a

5   mount operation from the storage system on one or more disk units at a remote storage system in

6   communication with said storage system so that said remote storage area serves as said storage

7   area accessible by the host computers,

8   wherein a utilization state of said remote storage area for said storage system is

9   monitored in said remote storage system, and

10   wherein whether or not one or more spare disk units in said storage system is to

11 be provided is decided according to said utilization state;

12   wherein providing spare disk units comprises sending a data packet from the

13 remote storage system to the storage system, said data packet identifying a remote unit ID of the

14 remote storage area that is to be stored in a port management table of the storage system in

15 accordance with a port ID of the storage system identified in a utilization demand message from

16 the storage system to the remote storage system and thereby mounting said remote storage area

17 and providing said remote storage area having said size and said speed as the storage area for

18 said storage system.

1   12.   (currently amended) A method of operating a storage system comprising

2   a disk array accessed by one or more host computers,

3   wherein when a the storage system detects that an amount of its free space has

4   become less than a predetermined value, a remote storage area is provided by determining if it is

5   possible to provide the remote storage area in accordance with a specification of the storage

6   system and, if it is possible, then performing a mount operation from the storage system on one

7   or more disk units at the remote storage system in communication with said storage system so

8   that said remote storage area serves as said storage area accessible by the host computers,

9   wherein data stored and managed in said remote storage area is copied to the

10 storage area of said storage system when the storage area of said storage system is enlarged;

11   wherein the mount operation comprises sending a data packet from the remote

12 storage system to the storage system, said data packet identifying a remote unit ID of the remote

13   storage area that is to be stored in a port management table of the storage system in accordance

14   with a port ID of the storage system identified in a utilization demand message from the storage

15   system to the remote storage system, and thereby mounting said remote storage area and

16   providing said remote storage area having said size and said speed as the storage area for said

17   storage system.

13-20. (canceled)

1   21.   (currently amended) A method of operating a storage system comprising

2   a disk array accessed by one or more host computers,

3   wherein when a the storage system detects that an amount of free space on at least

4   one first disk unit installed in said storage system has become less than a predetermined value, a

5   remote storage area that is provided by at least one second disk unit installed in a remote storage

6   system in communication with said storage system is made available as said storage area by

7   determining if it is possible to provide said remote storage area in accordance with specifications

8   of the storage system and, if it is possible, then by performing a mounting operation from the

9   storage system of said at least one second disk unit,

10   wherein said storage system stores a correspondence between:

11   a port ID for specifying each disk unit installed on said storage system, and

12   an identifier of said first disk unit, and

13   wherein, when said storage system uses said remote storage area as its storage

14   area by performing a mounting operation, said storage system stores a correspondence between:

15   said port ID, and

16   an identifier of said second disk unit that is provided by said remote storage

17   system area;

18   wherein a size and speed of at least one of reading and writing of said remote

19   storage area to be utilized are specified in a utilization demand message from said storage system

20   to said remote storage system that identifies a predetermined port ID of the storage system; and

21   wherein the mounting operation comprises sending a data packet from the remote

22   storage system to the storage system, said data packet identifying a remote unit ID of the remote

23   storage area that is to be stored in a port management table of the storage system in accordance

24   with the port ID of the storage system and thereby mounting said remote storage area and

25   providing said remote storage area having said size and said speed as the storage area for said

26   storage system accessible by the host computers.

1   22.   (currently amended) A method of operating a storage system comprising

2   a disk array accessed by one or more host computers, the method comprising:

3   receiving a utilization demand message at a remote storage system, wherein the

4   utilization demand message specifies a size and a speed of at least one of reading and writing of

5   a remote storage area of the remote storage system and that identifies a predetermined port ID of

6   the storage system;

7   determining if it is possible for the remote storage system to provide a remote

8   storage area to the storage system in accordance with the utilization demand message

9   specification of size and speed;

10   performing a mount operation from the storage system on one or more disk units

11   at the remote storage system so that said remote mounted disk units serve as additional storage

12   area for the storage system accessible by the host computers, in response to determining that it is

13   possible to provide said remote storage area, and otherwise indicating that no mount operation

14   could be performed;

15   wherein the mount operation comprises sending a data packet from the remote

16   storage system to the storage system, said data packet identifying a remote unit ID of the remote

17   storage area that is to be stored in a port management table of the storage system in accordance

18   with the port ID of the storage system and thereby mounting said remote storage area and

19   providing said remote storage area having said size and said speed as the storage area for said

20   storage system.

1   23.   (previously presented) A method of operating a storage system according

2   to claim 22, wherein the designation command designates a port ID of the storage system, to

3   which the remote storage area will be mounted.

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1   24.   (previously presented) A method of operating a storage system according

2   to claim 22, further comprising:

3   providing a remote unit ID to the storage system, wherein the remote unit ID

4   identifies the remote storage area of the performed mount operation.

1   25.   (previously presented) A method of operating a storage system according

2   to claim 22, wherein the remote unit is automatically mounted in response to detecting that an

3   amount of free space of the storage system has become less than a predetermined value.

1   26.   (previously presented) A method of operating a storage system according

2   to claim 22, wherein the utilization demand message specifies a write-in command for writing

3   data to a remote storage area of the remote storage system, the method further comprising:

4   writing the data to the remote storage area designated by the remote unit ID;

5   indicating that the write-in command was normally completed if the write-in

6   command was performed normally, and otherwise indicating that the write-in command was not

7   performed normally.

1   27.   (previously presented) A method of operating a storage system according

2   to claim 22, wherein the utilization demand message specifies a read-out command for reading

3   data from a remote storage area of the remote storage system, the method further comprising:

4   reading the data from the remote storage area designated by the remote unit ID;

5   indicating that the read-out in command was normally completed if the read-out

6   command was performed normally, and otherwise indicating that the read-out command was not

7   performed normally.

1   28.   (currently amended) A system comprising:

2   a storage system coupled to a host computer; and

3   a remote storage system coupled to said storage system;

4   wherein said storage system comprises:

5   a computer interface in communication with a-the host computer,

6   a cache memory,

7   a plurality of disk units for data storage, and

8   a disk adapter coupled to said plurality of disk units;

9   wherein the storage system provides a utilization demand message that is received

10   at the remote storage system, wherein the utilization demand message specifies a size and a

11   speed of at least one of reading and writing of a remote storage area of the remote storage system

12   and that identifies a predetermined port ID of the storage system, the remote storage system

13   determines if it is possible for the remote storage system to provide a remote storage area to the

14   storage system in accordance with the utilization demand message specification of size and

15   speed, and performs a mount operation is performed from the storage system on one or more

16   disk units at the remote storage system so that said remote mounted disk units serve as additional

17   storage area for the storage system accessible by the host computer, in response to determining

18   that it is possible to provide said remote storage area, and otherwise indicates that no mount

19   operation could be performed, wherein the mount operation comprises sending a data packet

20   from the remote storage system to the storage system, said data packet identifying a remote unit

21   ID of the remote storage area that is to be stored in a port management table of the storage

22   system in accordance with the port ID of the storage system and thereby mounting said remote

23   storage area and providing said remote storage area having said size and said speed as the storage

24   area for said storage system.